THE EQUATION OF CAUSALITY

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Abstract

We research the natural causality of the Universe. We find that the equation of causality provides very good results on physics. That is our first endeavour and success in describing a quantitative expression of the law of causality. Hence, our theoretical point suggests ideas to build other laws including the law of the Universe's evolution.

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1 Introduction

The motivation for our theoretical study of problem of causality comes from three sources. The first is due to physical interest: what is the cause of all? The second is from a story happened about non-Euclidean geometry. And the last one is our review of the four basic concepts: time, space, matter and motion.

1.0.1 Cause of all

If the World is in unification, then it must be unified by connections of causality, and the unification is to be indicated only in that sense.

According to that spirit, contingency, if there is really something by chance, is only product of indispensably.

Since the World is united in connections of causality, nothing of the World exists outside them, we can divide the World into two systems: A comprises all of what are called causes, and B all of what are called effects.

Eliminating from two systems all alike elements, we thus have the following possibilities:

1. Both A and B are empty, i.e. there are not pure cause and pure effect. In other words, the World have no beginning and no end.

2. A is not empty, but B is. Thus, there is an existence of a pure cause. The World have a beginning but no end.

3. A is empty, but B is not. There are no pure cause but a pure effect. The World have no beginning but an end.

4. Both A and B are not empty. The World have both a beginning and an end.

And only one of the four above possibilities corresponds with the reality. Which possibility is it and what is the fact dependent on?

If the World is assumed as a unity system comprising causes and effects, any effect must be a direct result of causes which have generated it, and these causes also had been effects, direct results of other causes before, etc. – there is no effect without cause.

A mystery motivation always hurries man to search for causes of every phenomenon and everything. Idealistic ideology believes that an absolute ideation, a supreme spirit, or a Creator, a God,... is the supreme cause, the cause of all. Materialistic ideology thinks that matter is the origin of all, the first one of all. That actuality is in contradiction.

If it is honesty to exist a supreme cause, then one must be the difference!

Indeed, if there were no existence of difference, there would not be any existence of anything, including idealistic ideology with its ideation, spirit and materialistic ideology with its material facilities. Briefly, If there were no difference, this World did not exist.

But, if the difference is the supreme cause, namely the cause of all causes, then it must be the cause of itself, or in other words, it also must be the effect of itself.

We have recognized the existence of difference, it means that we have tacitly recognized its relative conservation: indeed, you could not be idealist if you now are materialist; anything, as long as it still is itself, then cannot be anything else!

1.1 A story happened in geometry

Let us return an old story: a matter of argument about the axiomatics of Euclid's geometry.

Still by the only mystery motivation people always thirst for searching out "the supreme cause". The goal here is humbler, it is restrained in geometry, and the first to realize that was Euclid.

Euclid showed in his *Elements* how geometry could be deduced from a few definitions, axioms, and postulates. These assumptions for the most part dealt with the most fundamental properties of points, lines, and figures. His first four assumptions has been easily to be accepted since they seem seft-evident, but the fifth, the so-called Euclidean postulate, incited everybody to suspect its essence: "this postulate is complicated and less evident".

For twenty centuries geometers tried to purify Euclid's system by proving that the fifth postulate is a logical consequence of his other assumptions. Today we know that this is impossible. Euclid was right, there is no logical inconsistency in a geometry without the fifth postulate, and if we want it we will have to put it in at the beginning rather than prove it at the end. And the struggle to prove the fifth postulate as a theorem ultimately gave birth to a new geometry – non-Euclidean geometry.

Without exception, their efforts only succeeded in replacing the fifth postulate with some other equivalent postulate, which might or might not seem more self-evident, but which in any case could not be proved from Euclid's other postulates either.

By that way they affirmed that this problem had solved, Euclid's postulate was just an axiom, because the opposite supposition led to non-Euclidean geometry without immanent contradiction.

But... whether such a conclusion was accommodating?

While everybody was joyful because it seemed that everything was arranged all right and the proposed goal had been carried out: minimized quantity of geometric axioms and purified them, whimsically, a new axiom was intruded underhand into: Lobachevski's axiom – this axiom and Euclid's fifth excluded mutually!

Nobody got to know clearly and profoundly how this contradiction meant. But contradiction is still contradiction, it brought about many arguments and violent opponencies, even grudges.

Afterwards, since Beltrami had proved correctness of Lobachevski's geometry on pseu-

dosphere – an infinite two-space of constant negative curvature in which all of Euclid's assumptions are satisfied except the fifth postulate, the situation was made less tense.

If non-Euclidean geometers, from the outset, since setting to build their geometry, declared to readers that objects of new geometry were not Euclidean plane surface but pseudosphere, not Euclidean straight line but line of pseudosphere, maybe nobody doubted and opposed at all!

What a pity ! or it was not a pity that nothing happened such a thing?

But an actual regret was: the whole of problem was not what was brought out and solved on stage but what - its consequence - happened on backstage.

Because, even if non-Euclidean geometry was right absolutely anywhere, it meant: with the same objects of geometry – Euclidean plane surface and straight line – among them, nevertheless, there might be coexistence of two forms of mutually excludible relationships which were conveyed in Euclid's axioms and Lobachevski's axioms.

It was possible to allege something and other as a reason for forcing everybody to accept this disagreeableness, but that fact was not faithful. Here, causal single-valuedness was broken; here, relative conservation of difference was confused white and black; there was a danger that one thing was other and vice versa.

The usual way to "prove" that a system of mathematical postulates is self-consistent is to construct a model that satisfies the postulates out of some other system whose consistency is unquestioned.

Axiomatic method used broadly in mathematics is clear to bring much conveniences, but this method is only good when causal single-valuedness is ensured, when you always pay attention on order not to take real and physical sense away from considered subjects. Brought out forms of relationships of objects as axioms and defied objects - real owners of relationships, it is quite possible that at a most unexpected causal single-valuedness is broken and contradiction develops.

Because what we unify together is: objects are former ones, their relationships are corollaries formed by their coexistence, but is not on the contrary.

If we have a system of objects and we desire to search for all possible relationships among them by logically arguing method, perhaps at first and at least we have to know intrinsic relationships of objects.

Intrinsic relationships control nature of objects, in turn nature of objects directs possible relationships among them and, assuredly, among them there may not be coexistence of mutually excludable relationships.

Intrinsic relationship, according to the way of philosopher's speaking, is spontaneousness of things. Science today is in search of spontaneity of things in two directions: more extensive and more elementary.

Now return the story, as we already stated, the same objects themselve of Euclid's geometry had two forms of mutually excludable relationships, how is this understood?

It is only possible that Euclid's axiomatics is not completed yet with the meaning that: comprehension of geometrical objects is not perfected yet. Euclid himself had ever put in definitions of his geometrical objects, but modern mathematicians have criticized that they are "puzzled" and "heavily intuitive". According to them, primary objects of geometry are indefinable and are merely called points, lines, and sufaces, etc. only for historic reason.

But, geometrical objects have other names: "zero"-, "one"-, "two"-, and "three"-dimensional spaces ("zero"-dimesional space, thai is point, added by the author to complete a set).

We can ask that, could the objects self-exist independently? If could, why would they relate together?

Following logical course of fact, we realize that conceptions of objects are developed from experience which is gained by practical activities of mankind in nature, but which is not innate and available by itself in our head. (Therefore, we should not consider them apart from intuition, should not dispossess of ability to imagine them, how reasonless that is!).

Acknowledging at deeper level, we can perceive that no all of geometrical objects may exist independently, but any n-dimensional space is intersection of two other spaces with dimension higher one $(n + 1)$.

Thus, it seems that we have definitions: point is intersection of two lines; line is intersection of two surfaces; surface is intersection of two volumes, and volume... of what is it intersection?

However, in a geometry, by human imaginable capability, they are evident to be independent objects, and for convenience, we call them spatial entities.

Simplest geometrical objects are homogeneous entities. They are elements, speaking simply, in which as transferring with respect to all their possible degrees of freedom, it is quite impossible to find out any inner difference.

Objects of Euclid's geometry are a part of a system of homogeneous entities. If we build an axiomatics only for this part, it is clear that this axiomatics is not generalized.

An axiomatics used for homogeneous spaces is just one for spherical surface[2]. Euclid's geometry is only a limited case of this generalized geometry.

For spherical surface, that is homogeneous surface in general, there exists a following postulate: any two non-coincident "straight" lines ("straight" line is homogeneous line dividing the surface that contains it into two equal halves) always intersect mutualy at two points and these two points divide into two halves of each line.

It is possible to express further: any two points on a homogeneous surface belong to only a sole "straight" line also on that surface if they do not divide this line into two equal halves.

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[2]The surface of a sphere is a two-dimensional space of constant positive curvature.

Applying this postulate for Euclidean plane surface as a limited case, we realize immediately that it is just the purport of the first Euclidean axiom: through two given points it is possible to draw only a sole straight line. Indeed, any two points in an investigated scope of Euclidean plane surface belong to only a sole "straight" line since they do not divide this line that contains it into two equal halves.

So we can say that the mode of stating the fifth Euclidean postulate was inaccurate from the outset, because any two "straight" lines on a given homogeneous surface always intersect mutually at two points and divide into two halves of each other. In any sufficiently small region of the surface it would be possible to find either only one their intersectional point and the other at infinity or no point - they are at infinities. In this case these two "straight" line are regarded to be parallel apparently with each other.

Equivalent stating the fifth postulate, after correcting in the sense of above comment, is quite possible to be proved as a theorem.

There is a very important property of spatial entities that: any spatial entity is possible to be contained only in other spatial entity with the same dimension and the same curvature, or with higher dimension but no higher curvature.

This seems to be awfully evident: two circles with different curvatures are impossible to be contained in each other; a spherical surface with any curvature is impossible to contain a circle with lower curvature...

Similarly, two spaces with different curvatures are impossible to contain in each other. Curvature, here, is correspondent to any quantity characterized by inner relationship of investigated object.

1.2 Contradiction generated based on difference is dynamic power of all

In essence, the Nature is a system of positive actions and negative actions.

What has the Nature thus positive actions on and negative actions on?

Those secrets are explored and discovered by science more and more and in searching, if not counting its dynamic source, logical argument plays a great role.

But what we call logic is true not a string of positive actions and negative actions with all orders?

Because thought is only a phenomenon of the Nature, the law of positive actions and negative actions of thought is also the law of positive actions and negative actions of the Nature. In other words, the law of actions of the Nature is reflected and presented in the law of actions of thought.

This law is that: what without immanent contradiction is in positive action by itself, what with immanent contadiction is in negative action by itself.

Positive action (if looking after the process) and negative action (if looking back upon

the process) both have an ultimate target which is coming to and closing with a new action.

Let us take a class of similarly meaning concepts such as: having, existence, conservation, and positive action. In opposition to them, another class includes: nothing, non-existence, non-conservation, and negative action.

They belong among the most general and basic concepts, because in any phenomenon of the Nature: sensation, thinking, motion, and variation, etc. there are always their presences.

But it turned out to be that the powers of two classes of concepts are not equivalent to each other (and that is really a lucky thing!).

Let us now establish a following action, called *A action*:

"Having all, existing all, conserving all, and acting positively on all."

And an another, called *B action*, has opposite purport:

"Nothing at all, non-existing all, non-conserving all, and acting negatively on all."

Acting positively *A action* is acting negatively *B* action, and vice versa.

B action says that:

- 'Nothing at all', i.e. not having *B action* itself.

- 'Non-existing all', i.e. not existing *B action* itself.

- 'Non-conserving all', thus *B action* itself is not conserved.

- 'Acting negatively on all', this is acting negatively on *B action* itself.

Briefly, *B action* contains an immanent contradiction. It acts negatively on itself. Self-acting negatively on, *B action* auto-acts positively on *A action*. It means that: there is not existence of absolute nihility or absolute emptiness, and therefore, the World was born!

And *A action* acts on all, including itself and *B action*, but *B action* self-acts negatively on itself, so *A action* has not immanent contradiction.

Thus, in the sphere of *A action* all what do not self-act negatively on then self-act positively on.

1.3   What is the most elementary?

There are four very important concepts of knowledge that: *time*, *space*, *matter*, and *motion*.

They are different from each other, but is it true that they are equal to each other and they can co-exist independently?

Let us start from *time*. Is it an entity? Could it exist independently apart from *space*, *matter*, and *motion*? Evidently not! Just isolated *time* out of *motion*, the conception of it would be no longer here, time would be dead. And the conception of *motion* has higher independence than *time*'s.

So *time* is not the first. It could not self-exist, it is only consequence of remainders.

Motion is not the first either. It could not self-exist apart from *matter* and *space*. In fact, motion is only a manifestation of relationship between *matter* and *space*.

Thus, one of two remainders, *matter* and *space*, which is the most elementary? which is the former? or they are equal to each other and were born by one more elementary other? Perhaps setting such a question is unnecessary, because just as *time* and *motion*, *matter* could not exist apart from *space*. For instance, a concrete manifestation of matter, it exists not only because of itself but also because of simultaneous existence of space which surrounds it (and contains it) so that it is still itself.

Clearly, *matter* is also in spatial category and it is anything else if not the space with inner relationships different from those of usual space that we know?!

But now, according to the property of spatial entities raised in the previous subsection, this fact is contradiction: two same dimensional spaces of different curvatures (inner relationships) are impossible to contain in each other!

Thus, either we are wrong: it is evident to place coincidentally two circles of different radii in each other or the Nature is wrong: different spaces can place in each other, defying contradiction.

And contradiction generated by this reason is power of motion, motion to escape from contradiction.

Thus, we may to say that matter is spatial entity of some curvature.

But, where were spatial entities born from? and how can they exist? or are they products of higher dimensional spaces?, so what is about higher dimensional spaces?

Let us imagine that all vanish, including matter, space, ... and as a whole all possible differences.

Then, what is left?

Nothing at all!

But that is a unique remainder!

Clearly, this unique remainder is limitless and homogeneous "everywhere". Otherwise,

it will violate our requirement.

We now require the next: even the unique remainder vanishes, too. What will remain, then?

Not hardly, we indentify immedeately that substitute which replace it is just itself! Therefore, we call it absolute space.

The absolute space can vanish in itself, in other words, acting negatively it leads to acting positively itself. That means, the absolute space can self-exist not depending on any other. It is the former element.

It is the "supreme cause", too. Because, contrary to anyone's will, it still contains a difference.

Indeed, in the unique there is not anything, but still is the Nothing! Nothing is contained in Having, Nothing creates Having. Having, but Nothing at all!

Here, negative action is also positive action, Nothing is also Having, and vice versa. Immanent contradiction of this state is infinitely great.

Express mathematically, the absolute space has zero curvature. In this space there exist points of infinite curvatures. This difference is infinitely great and, therefore, contradiction generated is infinitely great, too.

The Nature did not want to exist in such a contradiction state. It had self-looked for a way to solve, and the consequence was that the Nature was born.

Thus, anew the familiar vague truth is that: "matter is not born naturally (from nihility), not vanished naturally (in nihility), it always is in motion and transformation from one form to other. Nowadays, it is necessary to be affirmed again that: "matter is just created from nothing, but this is not motiveless. The force that makes it generate is also the power makes it exist, move, and transform.

2 Representation of contradiction under quantitative formula: Equation of causality

Any contradiction is originated by coexistence of two mutually rejectable actions.

That is represented as follows:

$$
M = \left\{ \begin{array}{ll} A \neq A & - \text{Action } K_1 \\ A = A & - \text{Action } K_2 \end{array} \right. .
$$

Clearly, the more severe contradiction M will be if the higher power of mutual rejection between two actions K_1 and K_2 is. And power of mutual rejection of two actions is estimated only from the degree of difference of those two actions.

A contradiction which is solved means that difference of two actions diminishes to zero. Herein, two actions K_1 and K_2 all vary to reach and to end at a new action K_3.

Thus, what are the differences $[K_1 - K_3]$ and $[K_2 - K_3]$ dependent on? Obviously, these differences are dependent on conservation capacities of actions K_1 and K_2. The higher conservation capacity of any action is, the lower difference between it and the last action is.

And then, in turn what is conservation capacity of any action dependent on?

There are two elements:

It is dependent on immanent contradiction of action, the greater its immanent contradiction is the lower its conservation capacity is.

It is dependent on new contradiction generated by variation of action. The greater this contradiction is the more variation of action is resisted and, therefore, the higher its contradiction capacity is.

Variation, and one kind of which - motion, is generated by contradiction. More exactly, motion is a manifestation of solution to contradiction. The more severe contradiction becomes the more urgent need of solution to contradiction will be, and hence the more violent motion, variation of state, i.e. of contradiction will become. Call the violence, or the quickness of variation of contradiction Q, the contradiction state is M, the above principle can be represented as follows:

$$Q = K_{(M)}M.$$

We call it equation of causality, where $K_{(M)}$ is means of solution to contradiction. On simplest level, $K_{(M)}$ can be a function of contradiction state. Actually, it represents easiness of escape from contradiction of state.

If contradiction is characterized by quantities $x, y, z, ...$, these quantities themselves will be facilities of transport of contradiction, degrees of freedom over which contradiction is solved. Hence, easiness is valued as the derivative of contradiction with respect to its degree of freedom.

The greater derivative value of contradiction with respect to any degree of freedom is, the higher way-out "scenting" capability in this direction of state becomes, the more "amount of contradiction" escaped with respect to this degree of freedom is.

Thus,

$$K_{(M)} \sim |M'(x, y, z, ...)|.$$

And we have

$$Q = a\,|M'(x, y, z, ...)|\,M(x, y, z, ...),$$

where the coefficient a is generated only by choosing system of units of quantities.

We said that difference is the origin of all, but difference itself has no meaning. The so-called meaning is generated in direct relationship, in direct comparison. The Nature cannot feel difference through "distance".

A some state which has any immanent contradiction must vary to reach a new one having no intrinsic contradiction, or exactly, having infinitesimal contradiction.

That process is one-way, going continuously through all values of contradiction, from the beginning value to closing one.

We thus have endeavored to convince that motion (variation) is imperative to have its cause and property of motion obeys the equation of causality. Then, must invariation, i.e. conservation be evident without any cause? It is possible to say that: any state has only two probabilities – either conservable or variable, and more exactly, all are conserved but if that conservation causes a contradiction, then it must let variation have place to escape contradiction and this variation obeys the equation of causality.

If this theoretical point is true, our work is only that: learning manner of comprehension, estimating exactly and completely contradiction of state, and describing it in the equation of causality, at that time we will have any law of variation.

But is such enough for our terminal perception about the Nature, about people themselves with own thought power, to explain wonders, which always surprise generations: why can the Nature self-perceive itself, through its product - people?!

3 Using the causal principle in some concrete and simplest phenomena

Advance a quantity T, inverse of Q, to be stagnancy of solution to contradiction. Thus,

$$T = \frac{1}{aM'M}$$

The sum of stagnancy in the process of solution to contradiction from M_0 to $M_0 - \Delta M$ called the time is generated by this variation (Δt).

From the above definition and Figure 1, we identify that

$$\Delta t \approx -\frac{T + (T + \Delta T)}{2} \Delta M.$$

Thus,

$$\frac{\Delta M}{\Delta t} \approx -\frac{2}{2T + \Delta T}.$$

We have

$$\lim_{\Delta T \to 0, \Delta M \to 0, \Delta t \to 0} \frac{\Delta M}{\Delta t} = \frac{dM}{dt} = -\frac{1}{T} = -a\,|M'|\,M.$$

Therefrom, we obtain a new form of the equation of causality,

$$\frac{dM}{dt} = -a\,|M'(x, y, z, ...)|\,M(x, y, z, ...).$$

Thus, if we consent to the time as an independent quantity and contradiction as a time-dependent one, speed of escape from contradiction with respect to the time is proportional to magnitude of contradiction and means of solution.
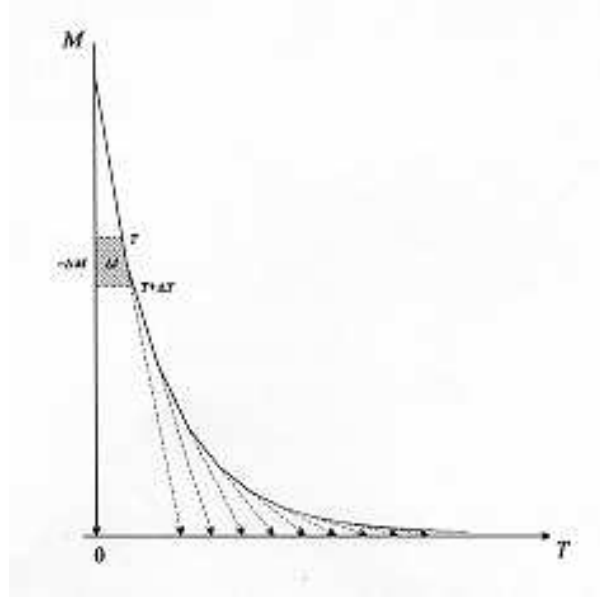
Figure 1: Variation of contradiction

In the case that contradiction is characterized by itself, namely $M = M_{(M)}$, we have

$$M = M_0 e^{-a(t-t_0)},$$

where M_0 is the contradiction at the time $t = t_0$.

3.1   Thermotransfer principle

Supposing that inn a some distance of an one-dimensional space we have a distribution of a some quantity L.

If the distribution has immanent difference, i.e. immanent contradiction, it will self-vary to reach a new state with lowest immanent contradiction. That variation obeys the equation of causality,

$$\frac{dM}{dt} = -a\,|M'|\,M.$$

For convenience, we spread this distribution out on the x axis and take a some point to be an origin of coordinates.

Because the distribution is one of a some quantity L, all its values at points in the space of distribution must have equidimension (homogeneity). And the immanent difference of distribution is just the difference of degree.

At two points x_1 and x_2, the quantity L obtains two values L_1 and L_2, respectively. Due to the difference of degree, there is only a way of estimation: taking the difference $(L_2 - L_1)$.

But two points x_1 and x_2 only 'feel' the difference from each other in direct connection, contradiction may appear or may not only in that direct connection: at a boundary of two neighbouring points x_1 and x_2, L quantity obtains simultaneously two values L_1 and L_2; two these actions act negatively on each other and magnitude of contradiction depends on the difference $(L_1 - L_2)$. Therefore, in order for the difference $(L_1 - L_2)$ to be the yield of direct connection between two points x_1 and x_2, we must let, for example, x_2 tend infinitely to x_1 (but not coincide with it).

Whereat, the immanent contradiction at infinitesimal neighbourhood of x_1 will be valued as the limit of the ratio:

$$\frac{L_1 - L_2}{x_1 - x_2},$$

as $x_2 \to x_1$, i.e. the derivative value of L over the space of distribution at x_1. From the presented problems, we have

$$M = \frac{dL}{dx} = \frac{\partial L}{\partial x}.$$

Substituting the value of M in the equation of causality:

$$\frac{\partial}{\partial t}\frac{\partial L}{\partial x} = -a\frac{\partial L}{\partial x}. \tag{1}$$

The immanent contradiction at each point is solved as Eq. (1). That makes the distribution vary.

We will seek for the law of this variation.

The immanent contradiction at neighbourhood of x is

$$M_{x,t} = \left.\frac{\partial L}{\partial x}\right|_{x,t}.$$

Later a time interval Δt, this contradiction is decreased to the value

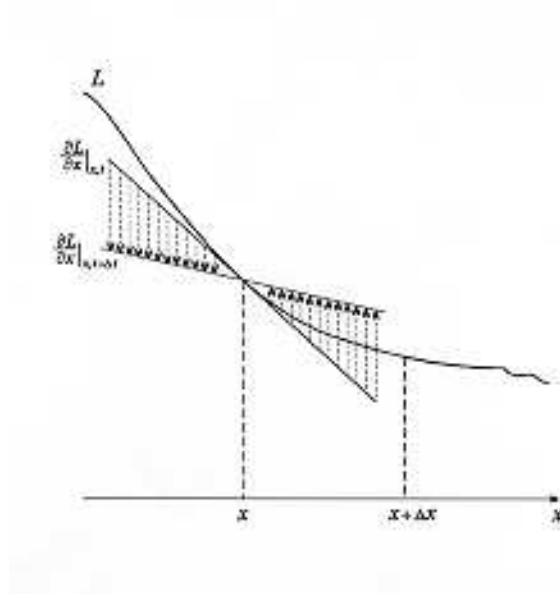$$M_{x,t+\Delta t} = \left.\frac{\partial L}{\partial x}\right|_{x,t+\Delta t}.$$

Thus, it seems that this variation has compressed a some amount of values of L from higher valued points to lower ones, making 'a flowing current' of values of L through x (Figure 2).

Clearly, the magnitude of 'the flowing current', i.e. the amount of values of L flows through x in the time interval Δt, is

$$\Im_x = \left.\frac{\partial}{\partial t}\frac{\partial L}{\partial x}\right|_x \Delta t = -a\left.\frac{\partial L}{\partial x}\right|_x \Delta t.$$

Similarly, at the point $x + \Delta x$ we have

$$\Im_{x+\Delta x} = -a\left.\frac{\partial L}{\partial x}\right|_{x+\Delta x} \Delta t.$$

Figure 2: The law of variation for L quantity

In this example, the current $\Im_x$ makes values of L at points in the interval Δx increase, and $\Im_{x+\Delta x}$ makes them decrease. The consequence is that the increment ΔL the interval Δx obtains is

$$
\begin{aligned}
\Delta L|_{\Delta t} &= a\Delta t \left(\left.\frac{\partial L}{\partial x}\right|_{x+\Delta x} - \left.\frac{\partial L}{\partial x}\right|_{x} \right) \\
&= a\Delta t \left.\frac{\partial^2 L}{\partial x^2}\right|_{x\leq\xi\leq x+\Delta x} \Delta x.
\end{aligned}
$$

The average density value $\overline{\Delta L}$ at each point in the interval Δx will be

$$
\overline{\Delta L}\big|_{\Delta t} \cong \frac{a\Delta t \left.\frac{\partial^2 L}{\partial x^2}\right|_{\xi} \Delta x}{\Delta x}.
$$

The exact value reaches at the limit $\Delta x \to 0$,

$$
\Delta L|_{x,\Delta t} = \lim_{\Delta x \to 0} \overline{\Delta L}\big|_{\Delta t} = a\Delta t \left.\frac{\partial^2 L}{\partial x^2}\right|_{x}.
$$

Thus

$$
\lim_{\Delta t \to 0} \left.\frac{\Delta L}{\Delta t}\right|_{x} = a\frac{\partial^2 L}{\partial x^2},
$$

or

$$
\frac{\partial L}{\partial t} = a\frac{\partial^2 L}{\partial x^2}. \tag{2}
$$

The time-variational speed of L at neighbourhood of any point of the distribution is proportional to the second derivative over the space of distribution of this quantity right at that point.

And as was known, Eq. (2) is just diffusion equation (heat-transfer equation) that had been sought on experimental basis.

On the other hand, the corollary of the above reasoning manner has announced to us the conservation of values of the quantity L in the whole distribution, although values of this quantity at each separate point may vary, whenever value at any point decreases a some amount, then value at its some neighbouring point increases right the same amount. If the space of distribution is limitless, then along with increase of time the mean value of distribution will decrease gradually to zero.

3.2   Gyroscope

The conservation of angular momentum vectors may be regarded as the conservation of two components: direction and magnitude. If in a system the directive conservation is not violated but the magnitude conservation of vectors is violated, this system must vary by some way so that the whole system will have a sole angular momentum vector. And in the case where the conservation not only of magnitude but also of direction are both violated, solution to contradiction of state depends on the form of articulation.

We now consider the case, in which the gravitational and centrifugal components may be negligible (Figure 3).
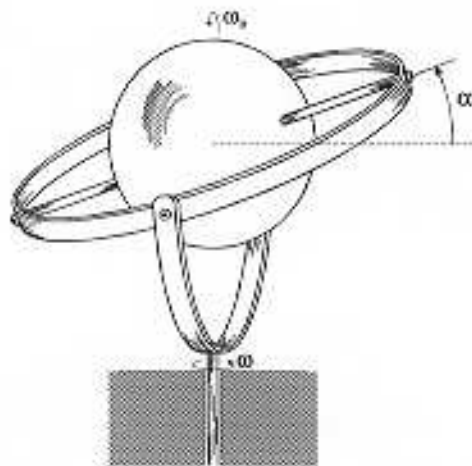

Figure 3: Gyroscope with only angle degree of freedom

For simplicity, we admit that there is a motor to maintain a constant angular velocity ω of system. Thus, we are only interested in the contradiction generated by violation of the directive conservation $k\omega_0$. The action K_1 – the conservation of $k\overrightarrow{\omega}_0$, say that: variational speed of the vector direction $k\overrightarrow{\omega}_0$ equals zero. But the action K_2 – the conservation of $\overrightarrow{\omega}$, say that: the direction $k\overrightarrow{\omega}_0$ must be varied with the angular velocity $\omega \cos \alpha$.

Thus, in macroscope, the difference $[K_1 - K_2] = \omega \cos \alpha$ is the origin of that contradiction, and the contradiction is proportional to this difference.

$$
\begin{aligned}
M &\sim \omega \cos \alpha, \\
M &= |k\overrightarrow{\omega}_0 \times \overrightarrow{\omega}| = k\omega_0 \omega \cos \alpha.
\end{aligned}
$$

The taken proportionality factor $k\omega_0$ (still in macroanalysis) is based on an argument: if ω_0 equals zero, the vector direction $k\overrightarrow{\omega}_0$ will not exist certainly, and therefore the problem of contradiction generated by its directive conservation will not be invented.

Taking the value of M into the equation of causality, we obtain

$$
\frac{\partial M}{\partial t} = -ak^2\omega_0^2\omega \sin \alpha \cos \alpha.
$$

Here, we have calcuted $M' = M'_\alpha$. From the equation we identify that if $\alpha = 0$, then the escaping speed of contradiction state will equal zero.

The derivative of contradiction with respect to the time is

$$
\frac{\partial}{\partial t}(k\omega_0\omega \cos \alpha) = -ak^2\omega_0^2\omega \sin \alpha \cos \alpha,
$$

or

$$
\frac{\partial \alpha}{\partial t} = ak\omega_0\omega \cos \alpha, \quad \alpha \neq 0. \tag{3}
$$

The variation of α causes a new contradiction, this contradiction is proportional to value of $\partial \alpha/\partial t$, therefore there is not motional conservation over the component α. And thus the escaping speed in Eq. (3) is also just the instantaneous velocity of the axis of rotation plane surface over α.

The time, so that the angle between the axis of rotation plane surface (i.e. the direction of the vector $k\overrightarrow{\omega}_0$) and the horizonal direction varies from the value $+0$ to α, will be

$$
t = \frac{1}{2ak\omega_0\omega} \ln \frac{1 + \sin \alpha}{1 - \sin \alpha}\bigg|_{+0}^{\alpha}.
$$

3.3   Buffer zone of finite space

Supposing that there is a finite space $[A]$ with intrinsic structure satisfying the invariance for the principle of causality.

This space is in the absolute space $[O]$. At the boundary of these two space there exists a contradiction caused by difference between them.

Because both of the spaces conserve themselves, contradiction is only possible to be solved by forming a buffer zone (i.e. field), owing to which difference becomes lesser and more harmonic. The structure of the buffer zone must have a some form so that the level of harmonicity reaches to a greatest value, i.e. immanent contradiction at each point in the field has lowest possible value.

It is clear that the farther from the center of the space $[A]$ it is the more the property of $[A]$ diminishes. In other words, the $[A]$-surrounding buffer zone (field) has also the property of $[A]$ and this property is a function of r – i.e. the distance from the center of the space $[A]$ to considered point in the field (Figure 4).
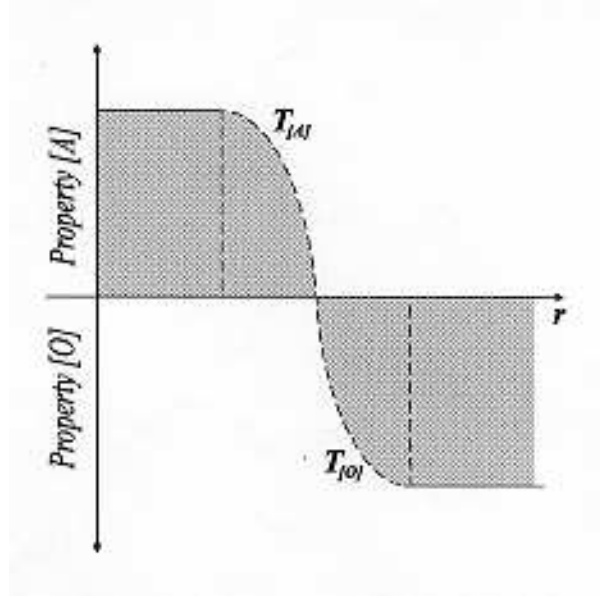

Figure 4: The structure of the buffer field of a finite space $[A]$

From the problems presented and if the notation of the buffer zone is T, we will have

$$T_{[A]} = g(r)\frac{[A]}{r},$$

where $g(r)$ is an unknown function of r alone, characterized for the intrinsic harmonicity of the field.

If in the field zone $T_{[A]}$ there is a space $[B]$ and this space does not disturb considerably the field $T_{[A]}$, whereat the difference between $[B]$ and $T_{[A]}$ forces $[B]$ to move in the field $T_{[A]}$ to approach to position where the difference between $[B]$ and $T_{[A]}$ has lowest value (here, we have admitted that the space $[B]$ has also self-conservation capability). This contradiction of state is proportional to the difference $([B] - T_{[A]})$.

If we detect a factor c to use for 'translating language' from the property of $[B]$ into

the property of $[A]$, then the contradiction may be expressed as follows

$$M = f. \left(c[B] - g(r)\frac{[A]}{r} \right),$$

where f is proportionality factor. And the law of motion of the space $[B]$ in the field $T_{[A]}$ is sought by the equation of causality,

$$\frac{\partial M}{\partial t} = -a|M'|M$$

$$= -af^2[A] \left| \frac{g(r) - rg'(r)}{r^2} \right| \left(c[B] - g(r)\frac{[A]}{r} \right).$$

Here, the transfer quantity (degree of freedom) of contradiction is r.

Because the motion of the space $[B]$ must happen simultaneously over all directions which have centripetal components, therefore the resultant escaping velocity of the state – i.e. the resultant velocity of the space $[B]$ in the field $T_{[A]}$ must be estimated as the integral of the escaping speed over all directions which have centripetal components.

$$\frac{\partial M}{\partial t} = -a[A]4\pi f^2 \int_0^{\pi/2} \left| \frac{g(r) - rg'(r)}{r^2} \right| \left(c[B] - g(r)\frac{[A]}{r} \right) \cos^2 \varphi \; d\varphi$$

$$= -a\pi^2 f^2[A] \left| \frac{g(r) - rg'(r)}{r^2} \right| \left(c[B] - g(r)\frac{[A]}{r} \right).$$

Expanding the left side hand, we obtain

$$f[A] \left(\frac{g(r)}{r} \right) \frac{\partial r}{\partial t} = -af^2\pi^2[A] \left| \frac{g(r) - rg'(r)}{r^2} \right| \left(c[B] - g(r)\frac{[A]}{r} \right),$$

or

$$\frac{\partial r}{\partial t} = -af\pi^2 \frac{g(r) - rg'(r)}{r^2} \left(c[B] - g(r)\frac{[A]}{r} \right).$$

Notice here that $g(r)$ is a function of r alone.

If proving that the variation of r as well as the conservation of $\partial r/\partial t$ causes a new contradiction proportional to right $\partial r/\partial t$, then the escaping speed obtained is just the instantaneous velocity of $[B]$ in the field $T_{[A]}$.